PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : C11D 9/22, 3/37, A61K 7/48

A1

(11) International Publication Number: WO 99/28429

(43) International Publication Date: 10 June 1999 (10.06.99)

(21) International Application Number: PCT/US98/25546

(22) International Filing Date: 2 December 1998 (02.12.98)

(30) Priority Data:
08/982,732 2 December 1997 (02.12.97) US

(71) Applicant: BUSH BOAKE ALLEN CORPORATION [US/US]; 7 Mercedes Drive, Montvale, NJ 07645 (US).

(72) Inventors: BALLINGALL, David, D.; 16 B First Street, Park Ridge, NJ 07656 (US). JOHNSON, Richard, L.; 196 Purple Slate Place, The Woodlands, TX 77381 (US).

(74) Agents: PARKER, David, W. et al.; Seed and Berry LLP, 6300 Columbia Center, 701 Fifth Avenue, Seattle, WA 98104-7092 (US).

(81) Designated States: CA, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: CLEANSING COMPOSITION CONTAINING POLYMERIC GELLANT

(57) Abstract

Cleansing compositions, such as bar soaps and liquid soaps, particularly for personal use, are prepared from a polymeric gellant and a surfactant. The polymeric gellant is a block copolymer, such as a diblock or triblock copolymer. The cleansing composition preferably contains a solvent which, in combination with the gellant, forms a gel. Hydrocarbons are preferred solvents. The cleansing composition may contain optional ingredients such as fragrance and emollients.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

CLEANSING COMPOSITION CONTAINING POLYMERIC GELLANT

TECHNICAL FIELD

This invention generally relates to personal cleansing compositions and, more particularly to bar and liquid soaps which may be used to provide anti-irritant protection, controlled release of fragrance for improved deodorancy and/or moisture to skin.

BACKGROUND OF THE INVENTION

Desired characteristics of skin, particularly human skin, are often expressed by adjectives such as soft, supple, clean-looking and fresh smelling. For this reason, assertions that a product deodorizes skin and/or provides skin with a light, clean, refreshing scent appear in association with many of today's cleansing compositions. Bar soaps (also referred to as soap bars) and liquid soaps are popular and effective cleansing products for skin. Some bar soaps incorporate anti-microbial agents as deodorants, however these agents are frequently irritating to human skin.

A humectant is a substance that absorbs or helps another substance retain moisture. Glycerol is an exemplary humectant. Many skin cleansing compositions contain humectants which exhibit topical efficacy, but are ineffective when delivered to the skin from a cleansing soap base. Such humectants are ineffective because they are water soluble and exhibit poor skin substantivity. Hydrophobic emollient materials are generally more substantive to the skin, but are difficult to incorporate into skin cleansing products. Difficulties observed include poor lather generation and instability of the product leading to separation of the components.

U.S. Patent No. 5,547,602 to Schuler is directed to soap bars which, in addition to assisting in personal cleansing, are formulated to achieve mildness, stability and skin moisturization. These soap bars contain conventional

bar soap components in admixture with petrolatum and a specifically defined emollient, such as an hydroxylated milk glyceride.

U.S. Patent No. 5,312,559 to Kacher et al. is directed to personal cleansing products in general, and more specifically to a stable dispersoidal semi-solid soap cleansing and moisturizing composition having defined amounts of fatty acid soap, free fatty acid, specified polyol and petrolatum emollient. The composition can be formulated as a semi-solid bar soap.

U.S. Patent No. 5,221,534 to DesLauriers et al. is directed to health and beauty aid compositions comprising one or more health and beauty aid components contained in a gel, including a mineral oil and blends of di- and tri-block copolymers based on synthetic thermoplastic rubbers. An article entitled "Stratum Corneum Lipids, Petrolatum and White Oils", *Cosmetics and Toiletries*, July 1993 by Dr. Stig E. Friberg relates to this technology.

Factors such as sun exposure, smoking, stress, disease, environmental factors and aging, all impact the structure of skin, making it less smooth, soft and supple. Accordingly, there is the need for combining the desirable properties of moisturizing, deodorizing, and minimal irritation into a cleansing soap bar in order to counter the undesirable effects of these factors. The present invention fulfills these needs and provides further related advantages.

SUMMARY OF THE INVENTION

In one aspect, the present invention provides a soap bar. The soap bar is prepared from the following components: a soap; a hydrocarbon gel prepared from one or more hydrocarbons and one or more polymeric gellants selected from diblock copolymers, triblock copolymer and mixtures thereof; and a non-polar fragrance. In preferred embodiments, the soap constitutes from about 60% to about 98% by weight of the total weight of the bar; the hydrocarbon gel constitutes from about 0.1% to about 10% by weight of the total weight of the bar; and the fragrance constitutes from about 0.1% to about 10% by

weight of the total weight of the bar. Optional components may be added to the formulation, including for example, one or more of an emollient and a moisturizer.

In another aspect, the present invention provides a cleansing composition. The cleansing composition is prepared from a surfactant and a polymeric gellant, where the polymeric gellant is selected from a diblock copolymer, triblock copolymer, multiblock copolymer, radial copolymer, and mixtures thereof. In preferred embodiments, the surfactant is soap, where the soap may be the sodium or potassium salt of a C8-C24 fatty acid. In the cleansing composition, the surfactant may contribute from about 60 wt% to 98 wt% of the total weight of the cleansing composition.

A hydrocarbon is a preferred optional component in the cleansing composition, where the hydrocarbon may be combined with the polymeric gellant to form a gel, and this gel combined with the surfactant and/or soap during formation of the cleansing composition. In such a cleansing composition, the polymeric gellant and hydrocarbon together typically contribute between 0.1% and 20%, preferably 1% to 10% of the total weight of the cleansing composition. A fragrance is another preferred optional component. When present, the fragrance typically constitutes about 0.1 wt% to about 25 wt% of the total weight of the cleansing composition.

The polymeric gellant is preferably a block copolymer, particularly a hydrocarbon block copolymer having aromatic and aliphatic blocks. Preferred blocks have a structure which results upon the homopolymerization of a monomer selected from styrene, butadiene, and isoprene. or the copolymerization of ethylene, propylene and/or butylene. Suitable polymeric gellant include, without limitation, styrene-butadiene-styrene triblock copolymer, styrene-isoprene-styrene triblock copolymer, styrene-ethylenebutylene-styrene triblock copolymer, styrene-ethylenepropylene diblock copolymer, styrene-butadiene diblock copolymer, and styrene-isoprene diblock copolymer. Preferred block copolymers are diblock and triblock copolymers.

In another aspect, the invention provides for a cleansing composition formed from surfactant and a gel, where the gel is formed from about 80-99 wt% of a hydrocarbon oil, and about 1 to 20 wt% of a blend of at least two different polymer members selected from the group of diblock copolymers, triblock copolymers, radial block copolymers and multiblock copolymers, with the proviso that there be contained in the composition at least one diblock copolymer or at least one triblock copolymer with said at least one diblock copolymer or said at least on triblock copolymer comprising 5 to 95 wt% of said blend of at least two different polymers, said diblock and triblock polymers comprising segments of styrene monomer units and rubber monomer units.

In another aspect, the invention provides a cleansing composition formed by combining ingredients including a polymeric gellant, a solvent, and a surfactant. The polymeric gellant and solvent are selected so that a gel can be formed upon combining the polymeric gellant and the solvent. The polymeric gellant may be a diblock copolymer, triblock copolymer, multiblock copolymer or radial copolymer; the solvent is preferably a hydrocarbon; and the surfactant preferably includes soap.

In another aspect, the invention provides a method of forming a cleansing composition. The method includes the step of combining a polymeric gellant, a solvent, and a surfactant so as to form a uniform composition. A "uniform" composition is one wherein the ingredients have been completely mixed together, so that there are no large domains of one ingredient separate from one or more other ingredients. The polymeric gellant and the solvent are selected so that, if these two components are combined, a gel will result. Preferably, the polymeric gellant is at least one of a diblock copolymer, triblock copolymer, multiblock copolymer and radial copolymer; the solvent is a hydrocarbon; and the surfactant includes soap.

These and other aspects of the invention will be evidence upon review of the following detailed description. To that end, cited references are set

forth for the purposes of clarity and completeness, and are herein incorporated by reference in their entirety.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a cleansing composition, preferably a personal cleansing composition. The cleansing composition may be in the form of either a solid, *e.g.*, a bar soap, or a liquid, a "pumpable" soap. The cleansing composition, which may also be referred to herein as the cleansing product, contains a surfactant and a polymeric gellant, and may contain various optional ingredients, as discussed in more detail below.

The surfactant may be an anionic, cationic or nonionic surfactant. In a preferred embodiment, the surfactant is an anionic surfactant, where a preferred anionic surfactant is a fatty acid salt. Fatty acid salt is a common component of commercial cleansing compositions, and is commonly referred to in the art and herein simply as "soap". In fact, fatty acid salt is the primary component of many, if not most, commercial bar soaps. Accordingly, fatty acid salt as used herein is a well-known material of commerce.

Fatty acid salt is composed of a carboxylate anion and a metal or ammonium cation, and may be represented by the formula $R\text{-}COO^- M^+$. The metal cation of the fatty acid salt is, for example, an alkali metal cation, such as a sodium or potassium cation. The ammonium cation is, for example, a tetraalkyl-ammonium cation, such as a tetramethylammonium cation. The carboxylate anionic component has an R group which is a hydrocarbon group, and preferably contains from about 8 to 24, and more preferably from about 10 to about 20, carbon atoms, in other words, R is preferably a C8-C24, and more preferably a C10-C20 hydrocarbon.

Fatty acid salts are available from a number of commercial suppliers. For example, Sigma (http://www.sigma.sial.com) sells the sodium salts of many fatty acids including, stearic acid, palmitic acid linoleic acid, and

oleic acid. Alternatively, fatty acid salts may be prepared by simple chemical reactions, as discussed below.

Fatty acid salts may be prepared by a so-called "neutralization" reaction, wherein a fatty acid (R-COOH) is reacted with a base (*e.g.*, MOH where "M" represent a metal). The reaction will typically occur at room temperature, merely upon mixing the fatty acid and the base, preferably in the presence of water. As another option, fatty acid salt may be prepared by a so-called "saponification" reaction, wherein a fatty acid ester (*e.g.*, fatty acid triglyceride) is reacted with a base (MOH). The saponification reaction is typically conducted in the presence of water, at an elevated temperature of about 100°C. In either event, the base contributes the M^+ component of the fatty acid salt, and may be, for example, sodium hydroxide when M^+ is Na^+. For convenience, the carboxylate component of the fatty acid salt will be discussed below in terms of the fatty acid or fatty acid ester from which it may be prepared.

Both fatty acids and fatty acid esters are available from a number of commercial suppliers, including Sigma (http://www.sigma.sial.com) and Aldrich (Milwaukee, WI). Plants and animal by-products are a suitable source of fatty acids and fatty acid esters. For example, many plants and animal by-products contain glycerides, which are esters formed between glycerol and fatty acid. These glycerides are sometimes referred to as fats or oils. These glycerides are commonly triglycerides, that is, each of the three hydroxyl groups of the glycerol is esterified with fatty acid. However, diglycerides and monoglycerides are also available in plants and animal by-products. Suitable plant and animal-derived glycerides from which to obtain fatty acid salts of the present invention include, without limitation, palm oil, coconut oil, babassu oil, soybean oil, castor oil, whale oil, fish oil, tallow, grease, lard and mixtures thereof. Fatty acids can also be synthetically prepared by, for example, oxidation of petroleum feedstocks by the Fischer-Tropsch process.

The soap may be a mixture of fatty acid salts. For example, the soap may be the saponification and neutralization product of tallow and base.

The term "tallow" as used herein refers to fatty acid esters derived from various animal by-products such as lard. Tallow typically contains a mixture of fatty acid esters, where the fatty esters may be distinguished from one another by the number of carbon atoms in the carbon chain which terminates with a carboxylate group. Natural tallow often contains unsaturated fatty acids and fatty acid esters in addition to saturated acids and esters. The tallow can be hardened (*i.e.*, hydrogenated) to convert part or all of the unsaturated fatty acid moieties to saturated fatty acid moieties, prior to or after the saponification reaction. Both hardened and non-hardened tallow are commercially available and may be used as the source of fatty acids in the present invention.

The components in the tallow, and the amounts of each component, will vary depending on the source of the tallow. A typical tallow, which is a suitable source of fatty acid of the invention, contains about 2.5% of C_{14} saturated fatty acid, 20% of C_{16} saturated fatty acid, 23% of C_{18} saturated fatty acid, 2% palmitic acid, 41.5% oleic acid, and 3% linoleic acid, where the percentage values refer to the weight percent of each component in the tallow.

Another suitable source of mixed fatty acids is coconut oil and coconut fatty acid, which, as the name implies, is the oil obtained from coconuts. A typical coconut oil has an approximate carbon chain length distribution of 8% C_8 saturated fatty acid, 7% C_{10} saturated fatty acid, 48% C_{12} saturated fatty acid, 17% C_{14} saturated fatty acid, 9% C_{16} saturated fatty acid, 2% C_{18} saturated fatty acid, 7% oleic acid and 2% linoleic acid. Other natural sources of mixed fatty acids includes palm kernal oil and babassu kernal oil, (although any other natural source may also be utilized provided it has a similar distribution of fatty acids). As the concentration of coconut-derived soap in the cleansing composition is increased, the composition is typically less able to maintain a rigid, bar-like structure and instead becomes more liquid.

Alkali metal soaps can be made by direct saponification of the fats and oils, or by the neutralization of the free fatty acids which are prepared in separate manufacturing process. Particularly useful are the sodium and

potassium salts of the mixtures of fatty acids derived from coconut oil and tallow (*i.e.*, sodium and potassium tallow and coconut soaps).

In part because fatty acid salts are so commonly used in preparing bar soaps, there are many commercial sources for various blends of fatty acid salts that are suitable for use in preparing a cleansing product. Oftentimes these blends are referred to as "soap pellets", and these soap pellets may be used to provide a "base" material for the preparation of the cleansing product of the present invention. Soap pellets are commercially available from a variety of sources. For instance, Armour Soap Co. (also known as Armour/Dial Corporation, Phoenix, Arizona) and Hewitt Base (The Hewitt Soap Co., Dayton, Ohio) both sell soap pellets which may be used as the surfactant in the present invention. These soap pellets may be used in liquid soaps of the invention, although in this case they are typically in combination with liquid (*e.g.*, glycerine or water) which will impart a fluid character to the liquid soap.

Another surfactant which may be used in the cleansing product of the present invention is a synthetic detergent. A suitable synthetic detergent is known generically in the art as "syndet". Syndet type surfactants are available from several commercial suppliers including Original Bradford Soap Works, Inc., West Warwick, Rhode Island. "Syndet" type soaps contain surfactant as the major ingredient, and for many purposes are the functional equivalent of a fatty acid salt. A typical syndet soap may contain 30-60 wt% sodium cocoyl isethionate, 20-50 wt% C14-C22 fatty acid, and 5-20 wt% soap base in addition to various optional ingredients, where these wt% values are based on the total weight of the syndet composition. As used herein, the term "soap" will refer to either of a fatty acid salt or a "syndet" as well as mixtures thereof.

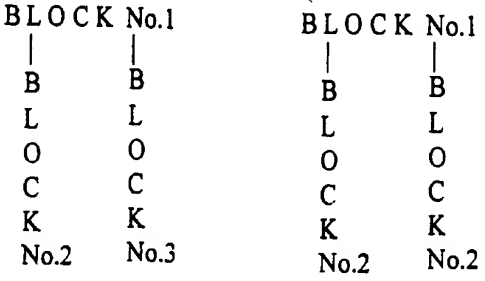
Further suitable surfactants include, without limitation, acyl isethionate, alkyl sulfate, alkyl sulfonate, alkyl ether sulfates, alkyl monoglyceride sulfonate, alkyl benzene sulfonate, ethoxylated fatty alcohol, fatty acid amide, and mixtures thereof and/or mixtures with the fatty acid salts or syndet as described above.

Suitable nonionic surfactants which may be incorporated into a cleansing composition of the invention include, without limitation, sorbitol and sorbitan esters, alkoxylated fatty alcohols or alkylphenols, preferably alkoxylated with ethylene oxide or mixtures of ethylene oxide and propylene oxide, sucrose esters, alkanolamides, polyglycol esters of fatty acids or fatty acid amides, ethoxylated lanolin derivatives, ethylene oxide/propylene oxide block copolymers, glycol esters and polyglycol esters, polyglycol esters of glycerol, and glycerol esters such as polyglycerol ester (PGE).

Suitable cationic surfactants which may be incorporated into a cleansing product of the invention include, without limitation, stearyldimethylbenzylammonium chloride, dodecyltrimethylammonium chloride, nonylbenzylethyldimethylammonium nitrate, tetradecylpyridinium bromide, laurylpyridinium chloride, cetylpyridinium chloride, laurylpyridinium bromide, laurylisoquinolinium bromide. ditallow(hydrogenated)dimethylammonium chloride, dilauryldimethylammonium chloride and stearylalkonium chloride.

In addition to one or more surfactants as discussed above, the cleansing composition of the present invention also contains a polymeric gellant. The polymeric gellant is a block copolymer, that is, a copolymer containing at least two blocks. As used herein, a "block" is a sequence of repeating chemical structures, and a block copolymer contains at least two different blocks which are covalently bonded together. A "block" may contain a single repeating structure, *i.e.*, be a hompolymer. Alternatively, a block may contain more than one repeating chemical structure. For example, a block may be formed by the copolymerization of ethylene (which provides for "E" residues in the copolymer) and butylene (which provides for "B" residues in the copolymer), where this copolymerization may result in an alternating copolymeric block such as EBEBEBEB, or a random copolymeric block such as EEBEEBBBEBEEEB or the like. Using this nomenclature, a homopolymer block would have a structure such as EEE...EEE or BBB...BBB where "..." represents some number of repeating structures.

The block copolymer may contain exactly two blocks, in which case it may be referred to as a diblock copolymer, or it may contain exactly three blocks, in which case it may be referred to as a triblock copolymer. The blocks may be joined together in a linear fashion, for example either of, (BLOCK No.1)-(BLOCK No.2)-(BLOCK No.3) or (BLOCK No.1)-(BLOCK No.2)-(BLOCK No.1), or the blocks may be joined together to form a "comb-like" structure, for example either of:



The polymeric gellant is preferably a hydrocarbon. As used herein the term "hydrocarbon" refers to a chemical structure containing carbon and hydrogen, and/or isotopes thereof such as deuterium, as essentially the only atoms present in the chemical. The qualification "essentially the only atoms" is used so as not to exclude polymers which contain a small number of atoms other than carbon and hydrogen, where those other atoms might be introduced to the polymer through, for example, the use of a chain transfer agent.

In a preferred embodiment, the polymeric gellant contains at least one block comprising aromatic residues, and at least one block comprising aliphatic residues. Thus, in the preferred embodiment, one block has repeating residues of a structure resulting from the polymerization of an aromatic monomer, such as styrene and/or alpha-methyl styrene. A preferred block copolymer contains at least one block having a structure which results from the polymerization of styrene, alpha-methyl styrene, or a mixture thereof, where the residues from these monomers are the predominant residues which constitute the block(s). More preferably, the polymeric gellant contains at least one block

having the structure which results from the polymerization of styrene, where the styrene-derived residues are the predominant number of residues in the block.

The polymeric gellant preferably has a structure wherein at least one block has repeating units of aliphatic character. Thus, the "aliphatic" block contains residues having the structure which results from the polymerization of a C2-C18 olefinic non-aromatic hydrocarbon. The olefinic non-aromatic hydrocarbon has at least one, and may have two or more carbon-carbon double bonds. Preferably, the block contains residues having the structure which results from the polymerization of a C2-C8 olefinic non-aromatic hydrocarbon. Suitable hydrocarbon monomers which may be used to prepare the block include, without limitation, ethylene, propylene, butylene, isoprene, butadiene, and the like.

The diblock polymeric gellants of the present invention may be represented by the formula $(AB)_n$, where A and B represent blocks of different chemical compositions and "n" indicates that the gellant contains a plurality "n" of such blocks. Suitable diblock copolymer gellants include, without limitation, styrene-(ethylene-propylene) (S-EP), styrene-(ethylene-butylene) (S-EB), styrene-butadiene (SB) and styrene-isoprene (SI). For clarity, the designation styrene-(ethylene-propylene) indicates a diblock copolymer, where one block is polystyrene and the other block is the result of the copolymerization of ethylene and propylene.

Commercially available gellants which are especially useful in forming the cleansing compositions of the present invention are sold under the trademark KRATON® by Shell Chemical Company of Houston Texas. The KRATON® rubber-type polymers are also called elastomers. KRATON® rubbers are preferred polymeric gellants of the present invention because they have an unusual, but highly desirable combination of high strength and low viscosity. These properties for the KRATON® rubbers are presumably a consequence of their unique molecular structure. The KRATON® rubbers may be described as linear diblock, triblock and radial copolymers. According to Shell Chemical Company, each molecule of the KRATON® rubber consist of

block segments of styrene monomer units and rubber monomer and/or comonomer units. A preferred $(AB)_n$ diblock copolymer is KRATON® G-1702 copolymer.

Triblock copolymers which may be used as polymeric gellants in the present invention are also available from Shell Chemical Company under their KRATON® trademark. Such triblock KRATON® rubbers have polystyrene endblocks and elastomeric midblocks. Each block segment may consist of 100 or more monomer or comonomer units. The most common structure for the triblock copolymer is a linear ABA block type. Examples include styrene-butadiene-styrene (SBS) and styrene-isoprene-styrene (SIS), which is the KRATON® D rubber series.

Preferred triblock polymeric gellants are selected from the KRATON® G series rubbers. The KRATON® G rubbers are styrene-ethylene-butylene-styrene (S-EB-S) copolymers. The KRATON® G series is preferred in the practice of the present invention because the copolymers of this series are hydrogenated and thus more thermally stable. Therefore, decomposition is less likely to occur during elevated temperature blending of G series polymers with the solvent component of the gel than will typically occur with the D series polymers which have unsaturation within the rubber block.

The KRATON® G rubbers are compatible with various hydrocarbons (*e.g.*, paraffinic and naphthenic oils). In fact, the KRATON® rubbers may take up more than 20 times their weight in oil to make a product which can vary in consistency from a "Jell-O®" to a strong elastic rubbery material depending on the grade and concentration of the rubber. Preferred triblock polymers include KRATON® G-1650 and KRATON® G-1651 rubbers, both from Shell Chemical. KRATON® G-1650 rubber is an S-EB-S triblock copolymer with a specific gravity of about 0.91, and a tensile strength of about 500 psi as measured by ASTM method D-412-tensile jaw tester using a separation speed of 10 in/min. The styrene to rubber content of KRATON® G-1650 is said by the manufacturer to be about 29:71, and the Brookfield viscosity

is about 8000 (toluene solution, cps at 77°F, 25%w). The Shore A hardness is about 75.

Other block copolymers described in the art may also be used as the polymeric gellant in the practice of the present invention. For example, the block copolymers as described in the following disclosures may be used: PCT Publication WO88/00603; European Patent Application No. 224389; U.S. Patent No. 5,221,534; PCT Publication WO97/08282; U.S. Patent No. 4,369,284; and U.S. Patent No. 5,132,355, where these disclosures are incorporated by reference herein.

The block copolymer useful in the invention may function as a gellant (*i.e.*, be a polymeric gellant). A polymer which may function as a gellant is a polymer which, upon being combined with a suitable liquid solvent, will form a gel. This combination step typically requires mixing the polymer and solvent, heating the two with stirring until a homogeneous liquid results, and then cooling the resulting liquid whereupon a gel spontaneously forms. The polymeric gellant is a block copolymer as described above, and is preferably a blend of at least two block copolymers. The polymeric gellant preferably can form a gel with a hydrocarbon.

The polymeric gellants of the invention have the property of being thermoplastic. In other words, they may be heated to a fluid state, cooled to a solid state, and then reheated to a fluid state. In addition, the polymeric gellants of the invention have the property of being "rubbery", where this property is understood in the art even though it is difficult to precisely define. In general, a rubber will tend to flex rather than fracture when subjected to a force, and after being deformed upon subjection to a force, a rubber will, of its own accord, tend to restore itself to its original shape.

In the cleansing compositions of the present invention, there is preferably more surfactant than polymeric gellant on a weight basis, or in other words, the weight ratio of surfactant to polymeric gellant is greater than 1. The surfactant is typically present in an amount ranging from about 60% to about

98% by weight of the cleansing composition, and is preferably about 85 to 95% by weight of the cleansing composition. The block copolymer is typically present in an amount ranging from about 0.01% to 20% by weight of the cleansing composition, and is preferably about 0.1% to 10% by weight of the cleansing composition. In one embodiment of the invention, non-soap surfactants contribute less than 50% by weight of the total weight of the surfactants, preferably less than 25% by weight, and more preferably less than 10% by weight. In another embodiment of the invention, soap (*i.e.*, fatty acid salts and/or syndet) is the only surfactant present in the cleansing product composition.

The cleansing composition may, and preferably does, contain optional ingredients. A preferred optional ingredient is a solvent which, in combination with the polymeric gellant, forms a gel. Such gel formation is readily accomplished by combining the desired proportions of polymeric gellant and solvent, heating the mixture, preferably with stirring, to achieve a homogeneous molten liquid, and then cooling this liquid whereupon a gel spontaneously forms. The gel has the property that it is self-supporting to some degree, in other words, a cube of gel will be able to stand on a flat surface and retain its cubic structure in the absence of a shearing force.

In a preferred embodiment of the invention, the polymeric gellant is combined with a solvent so as to form a gel, and then the gel is combined with the surfactant. A preferred solvent is a hydrocarbon, however other suitable solvents include ester-, ether- and hydroxyl-containing organic liquids. As used herein, the term "hydrocarbon gel" refers to a mixture of liquid hydrocarbon and a polymeric gellant, where the polymeric gellant is a thermoplastic rubber-type polymer as described above. Thus, a composition comprising a soap, a hydrocarbon gel and a non-polar fragrance will contain soap, hydrocarbon, polymeric gellant and non-polar fragrance, regardless of whether the polymeric gellant and the hydrocarbon retain a "gel" structure within the composition. The product of combining a gel, a soap and a non-polar fragrance is a composition

comprising gel, soap and non-polar fragrance for the purposes of the present invention.

The hydrocarbon solvent present in the gel and cleansing product of the present invention is a liquid prior to being incorporated into the cleansing composition or gel, and may retain a liquid state within the cleansing composition or may be in a gelled state. The hydrocarbon solvent has about 8 to 30 carbon atoms. Suitable hydrocarbon solvents include, without limitation, mineral oils, mineral solvents, mineral spirits, synthetic hydrocarbons, animal oils, vegetable oils and mixtures of these hydrocarbons. A preferred group of hydrocarbon oils are synthetic isoparaffin hydrocarbons sold under the tradename ISOPAR® from Exxon. The most preferred being a mixture of C_{10} - C_{12} synthetic hydrocarbons available under the name ISOPAR®M. The present inventors have discovered that ISOPAR®M imparts moisturizing characteristics to a cleansing composition of the invention, and has a volatility (vapor pressure profile) which increases the ability of the gel to allow additives such as fragrances to release slowly over time.

As stated above, in a preferred embodiment of the invention, the polymeric gellant is combined with a solvent so as to form a gel, and then the gel is combined with the surfactant. Typically, the gel is formed by combining 1% to 20% by weight of polymeric gellant and 80% to 99% by weight of hydrocarbon or other suitable solvent, where these weight percent values are based on the total of the solvent and gellant in the composition. The cleansing composition of the invention typically contains 0.1% to 20% by weight of the hydrocarbon gel and 60% to 98%, preferably 80% to 95% of surfactant. Preferably, the cleansing composition contains from about 0.5% to 10%, and more preferably about 1% to about 5% of the hydrocarbon gel.

The cleansing composition may contain further optional components. Such optional components may enhance various properties of the cleansing composition, and/or allow the cleansing composition to be prepared more easily. Components that are presently known and utilized in the

manufacture of cleansing compositions may be incorporated into the cleansing compositions of the present invention, where such components include, without limitation, antibacterial agent, colorant (*e.g.*, dye), emollient, fragrance, humectant, moisturizer, pH-adjusting agent (*e.g.*, citric acid, succininc acid) preservative, sequestering agent (*e.g.*, ethylene diamine tetraacetate), suspending agent (*e.g.*, magnesium/aluminum silicate), water, and the like. Another suitable optional component for the cleansing composition of the invention is a hydrocarbon-soluble material.

The antibacterial agent may be any of the antibacterial agents conventionally used in soap preparation. Typical antibacterial agents which may be used in the present invention include, without limitation, 3,4-dibromosalicyclanilide, 3,4,5-tribromosalicyclanilide, 4,4'-dichloro-3-(trifluoromethyl)carbanilide, 3,4,4'-trichlorocarbanilide, and mixtures thereof. When present, the agent should be present in the composition in an effective amount to provide antibacterial properties to the soap and skin to which the soap has been applied. This effective amount is typically a concentration of about 0.5% to about 4% by weight, based on the total weight of the composition. The presence of an antibacterial agent is desirable in that it may impart a deodorant benefit to the cleansing composition.

The cleansing composition of the invention may contain an emollient. Emollients are commonly incorporated into cleansing compositions and skin lotions, and accordingly are well-known in the art. Such emollients may be used in the present invention. A suitable emollient is hydroxylated milk glyceride, which is the lipid fraction of milk. Such hydroxylated milk glyceride is primarily the triglyceride of long chain fatty acids having carbon length of 16 and 18, where those fatty acids are typically unsaturated. Hydroxylated milk glyceride is commercially available from, *e.g.*, Amerchol Corporation, Edison, NJ under their Cremerol HMG designation.

Other suitable emollients for incorporation into a cleansing composition of the present invention include, without limitation, lanolin,

hydoxylated lanolin, acetylated lanolin alcohols, mineral oil, fatty acid esters such as isopropyl myristate and glycerol dilaurate, methyl glucose ether, cholesterol, cholesterol esters, squalene, squalane, silicon oils and mixtures thereof.

When present, the emollient is typically incorporated into a cleansing composition of the present invention in an amount effective to impart emolliency to the cleansing composition, where that effective amount is typically a concentration of about 0.1% to 20%, more typically from about 0.5% to about 10%, more typically from about 0.5% to about 5%, and still more typically from about 1% to about 3%, where these percentage values are weight percentages based on the total weight of the cleansing composition.

A preferred optional component is a fragrance. The fragrance imparts a pleasant odor to the cleansing composition, which is desired by many consumers. Suitable fragrances include, but are not limited to, perfumes, essential oils, aroma chemicals, absolutes, balsams, concentrated oils, extracts and mixtures thereof. Examples of synthetic and natural fragrances include, but are not limited to, terpene hydrocarbons, esters, ethers, alcohols, phenols, ketones, acetals, oximes and derivatives and mixtures thereof. As recognized by those skilled in the art of perfumery, a typical perfume or fragrance may contain 10 to 150 different chemicals.

When present, the fragrance preferably has a non-polar nature in order to maximize the polymeric gellant's effect thus providing metered controlled release. Whether a fragrance has a non-polar nature may be determined by combining approximately ten parts by weight of the fragrance and ninety parts by weight of a non-polar liquid (*e.g.*, a hydrocarbon such as ISOPAR® or mineral oil), and visually determining whether a homogeneous mixture results. The amount of fragrance present within the cleansing composition of the invention will depend on how strongly the cleansing composition should desirably smell. Thus, an effective amount of fragrance should be present, where an effective amount is typically with the range of from

about 0.1 to 25%, preferably from about 0.5 to 5%, and most preferably from 0.75 to 2% of a fragrance with a non-polar character, where these percentage values are weight percentages, based on the total weight of the cleansing composition.

The cleansing composition of the invention may contain a moisturizer. Moisturizers are commonly incorporated into cleansing compositions and skin lotions, and accordingly are well-known commercial products. Such moisturizers may be used in the present invention. A suitable moisturizer is a petrolatum that is recognized as suitable for application to skin. Such pretrolatums include hydrocarbon mixtures formulated with mineral oils in combination with paraffinic waxes. The petrolatum may be any grade of light or yellow petrolatum. A preferred petrolatum that may be used in the present invention is USP Class III having a melting point between 50°C and 57°C, which is commercially available from, *e.g.*, Penreco as their Snow White Pet. USP.

The moisturizer should be incorporated into the cleansing composition in an amount effective to allow the cleansing composition to impart a moisturizing effect to the skin that is contacted with the cleansing composition. This effective amount is typically an amount within the range of about 0.1% to 20%, more typically 1% to 10% by weight of the entire weight of the cleansing composition.

One or more preservatives may be incorporated into the cleansing composition. Suitable preservatives include, without limitation, benzyl alcohol, methyl paraben, propyl paraben and imidazolindinyl urea. The preservative(s) is present in an effective amount, and typically in an amount of less than 1 wt% of the total weight of the cleansing composition.

Another optional component of the cleansing composition is a hydrocarbon-soluble substance. An example of a hydrocarbon-soluble substance is a volatile hydrocarbon-soluble substance. A volatile hydrocarbon-soluble substance contains at least about 5 carbon atoms, preferably at least 8 carbon atoms, but less than about 30 carbon atoms. In addition to carbon atoms, the

volatile hydrocarbon-soluble substance may contain one or more functional groups, such as hydroxyl, carboxylic acid and carboxylic acid esters. Preferably, the volatile hydrocarbon-soluble substance has a vapor press of less than about 600 mm Hg at 20° C. As recognized in the art, there is a general tendency for substances to become more volatile as their molecular weight decreases, although this trend can be significantly effected by the substituents on the carbon chain of the substance.

The volatile hydrocarbon-soluble substance enhances the release of active ingredients from the cleansing compositions, where "active ingredients" refer to fragrance and/or deodorant components of the cleansing composition. The active ingredients will be released from the cleansing composition by evaporation (volatilization).

In combination, the hydrocarbon which forms a gel with the polymeric gellant, and volatile hydrocarbon-soluble substance, typically constitute from about 20 to about 95 weight percent of the total weight of the gel, and preferably constitutes about 65 to about 95 weight percent, and more preferably will range from about 80 to about 95 weight percent of the gel. Most preferably, the total weight of the hydrocarbon and hydrocarbon-soluble substance in the gel is about 85 weight percent, though this preference may change depending upon the particular application desired, as will be apparent to one skilled in the art.

The cleansing composition may, but preferably does not contain a large amount of water. In one embodiment of the invention, the cleansing composition does not contain any water. However, when present, the water may constitute up to about 30 wt% of the cleansing composition, preferably up to about 20 wt%, and more preferably up to about 5 wt%.

In preferred embodiments of the invention, the cleansing composition is prepared from ingredients including soap pellets in an amount ranging from 70-95 wt%, preferably 85-95 wt%, a gel formed from ingredients including hydrocarbon and polymeric gellant selected from diblock and triblock

thermoplastic rubbers of the "KRATON" type described above in an amount ranging from 0.1-10 wt%, preferably 1-5 wt%, and fragrance in an amount ranging from 0.1-10 wt%, preferably 1-5 wt%. In additional preferred embodiments, the cleansing composition additionally contains glycerine in an amount ranging from 0.1-10 wt%, preferably 1-5 wt%, water in an amount ranging from 0.1-10 wt%, preferably 1-5 wt%. As used herein, wt% values are based on the total weight of the cleansing composition.

A preferred cleansing composition of the present invention includes a surfactant and a gel, where the gel contains about 80-99 wt% of a hydrocarbon solvent, and about 1 to 20 wt% of a blend of at least two different polymer members selected from diblock copolymers, triblock copolymers, radial block copolymers and multiblock copolymers. The cleansing composition contains at least one diblock copolymer or at least one triblock copolymer, where the diblock or triblock copolymer constitutes 5 to 95 wt% of the blend of the polymer members. The diblock and triblock copolymers include segments of styrene monomer units and rubber monomer units. In preferred embodiments, diblock copolymer and triblock copolymer are the only gellants present in the composition. The composition may further incorporate one or more optional ingredients such as are commonly employed in cleansing compositions, where suitable optional ingredients include, without limitation, sunscreen agents, fragrance oils, moisturizers, anti-perspirants, humectants, cosmetic oils, colorant, preservative, eiluent, excipient, and mixtures thereof.

The cleansing composition of the invention may be prepared by combining the various components. This combining step is preferably accomplished by mixing the various ingredients together, heating these ingredients to form a homogeneous mixture, and then allowing the resulting mixture to cool. Bar soaps of the present invention can be prepared using any conventional soap-making method. For example, in order to prepare a soap bar, suitable amounts of the desired components may be heated to 120-125°F (50°C) in order to improve liquid flow. This mixture is added to the surfactant, such as

the base soap or syndet mixture, in an amalgamator. It may then be extruded for cutting and/or stamping into soap bars.

The cleansing compositions of the present invention may be in the form of a bar soap, or may have a less rigid consistency. For example, the cleansing composition may be a liquid soap, which may be pumped out of a dispenser. In addition, the cleansing composition may be a so-called semi-solid. A semi-solid cleansing composition will typically have a viscosity of 60,000 to 400,000 centipoise (cps), preferably 70,000 to 200,000 cps at about room temperature. However, preferably, the cleansing composition is a bar soap. The precise consistency of the composition may be achieved by proper selection of the components and amounts thereof in the composition. As the amount of liquid components is increased, the cleansing composition tends to have a more fluid consistency.

As used herein, the term "liquid soap" refers to a non-solid cleansing composition, which will flow at room temperature and thus must be stored in a container. For convenience, such liquid soaps may be dispensed from a container by a pumping action. Alternatively, the consumer may dip his or her hand into the container and scoop out some of the liquid soap.

The cleansing compositions of the present invention may be used in the conventional manner. Thus, the skin to be cleansed is moistened with water, the cleansing composition is applied to the area to be cleaned, and the area is rubbed, preferably with the concomitant production of a lather. The soap/lather is then rinsed off.

The following examples demonstrate the cleansing compositions of the present invention. These examples are given as an illustration only and are not intended to limit the scope of the invention. In the Examples, the terms "Gel", "gel", "Hydrocarbon Gel" and the like refer to a gel having a composition containing KRATON® G-1650 and ISOPAR® M, each as described above.

EXAMPLE 1

PREPARATION OF CLEANSING PRODUCT COMPOSITION

A cleansing product was prepared by combining the ingredients in the amounts indicated in Table 1 and then mixing these ingredients together.

Table 1

CLEANSING PRODUCT COMPOSITION

Soap Pellets (80% Tallow, 20% Coconut)	92.00	Hewitt Base
Hydrocarbon Gel	1.50	
Fragrance	1.50	Bush Boake Allen
Glycerine	2.00	
Water	2.50	
Titanium Dioxide	.50	
	100.00	

EXAMPLE 2

SKIN IRRITANCY DATA

Four test materials were prepared as set forth in Table B, and tested for their impact on skin barrier function. Test material 1 was water, which served as a negative control. Test material 2 was a mixture of soap base, hydrocarbon gel and fragrance. Test material 3 was the same as test material 2, except that the hydrocarbon gel was omitted. Test material 4 was a 1% solution of sodium lauryl sulfate (SLS), which served as a positive control. The results of these tests are presented in Table 2.

Table 2

TEWL - MEAN ADJUSTED EVAPORIMETER MEASUREMENTS (N = 11; G/M2/HR)

Test Material	Mean Peak	Mean Recovery
1. Water (negative control)	2.69	1.34
2. Soap, Gel, Fragrance	5.57	1.77
3. Soap, Fragrance, no Gel	8.56	2.53
4. 1% SLS (positive control)	22.53	7.87

As evidenced by the results shown in Table 2, the transepidermal water loss (TEWL) value is lower when polymeric gellant is included (Test Material 2) than when the polymeric gellant is omitted (Test Material 3), thus showing that the gellant aids in protecting the stratum corneum under irritant challenge by the soap and fragrance. Therefore, the data of Table 2 indicates that under repeat application patch challenge, the gellant reduces the impact of soap and fragrance on skin barrier function.

From the foregoing it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

CLAIMS

We claim:

1. A soap bar comprising:

(a) a soap;

(b) a hydrocarbon gel comprising hydrocarbon and one or more polymeric gellants selected from diblock copolymers, triblock copolymer and mixtures thereof; and

(c) a non-polar fragrance.

2. The bar of claim 1 wherein the soap constitutes from about 60% to about 98% by weight of the total weight of the bar.

3. The bar of claim 1, wherein the hydrocarbon gel constitutes from about 0.1% to about 10% by weight of the total weight of the bar.

4. The bar of claim 1 wherein the fragrance constitutes from about 0.1% to about 10% by weight of the total weight of the bar.

5. The bar of claim 1 further comprising an emollient.

6. The bar of claim 1 further comprising a moisturizer.

7. A cleansing composition comprising a surfactant and a polymeric gellant, the polymeric gellant selected from the group consisting of diblock copolymer, triblock copolymer, multiblock copolymer, radial copolymer, and mixtures thereof.

8. The cleansing composition of claim 7 wherein the surfactant is soap.

9. The cleansing composition of claim 8 wherein the soap comprises the sodium or potassium salt of a C8-C24 fatty acid.

10. The cleansing composition of claim 7 wherein the weight ratio of surfactant to polymeric gellant is greater than 1.

11. The cleansing composition of claim 7 wherein the surfactant contributes from 60 wt% to 98 wt% of the total weight of the cleansing composition.

12. The cleansing composition of claim 7 wherein the polymeric gellant is a hydrocarbon comprising at least one aromatic block and at least one aliphatic block.

13. The cleansing composition of claim 7 wherein the polymeric gellant is selected from diblock and triblock copolymers.

14. The cleansing composition of claim 13 wherein the polymeric gellant comprises blocks selected from a homopolymerization product of a monomer selected from styrene, alpha-methyl styrene, butadiene, and isoprene, and a copolymerization product of at least two monomer selected from the group consisting of ethylene, propylene and butylene.

15. The cleansing composition of claim 14 wherein the polymeric gellant is selected from styrene-butadiene-styrene triblock copolymer, styrene-isoprene-styrene triblock copolymer, styrene-(ethylene-butylene)-styrene triblock copolymer, styrene-(ethylene-propylene) diblock copolymer, styrene-butadiene diblock copolymer, and styrene-isoprene diblock copolymer.

16. The cleansing composition of claim 7 further comprising a C8-C30 hydrocarbon.

17. The cleansing composition of claim 16 wherein the hydrocarbon and polymeric gellant form a gel upon being combined with one another.

18. The cleansing composition of claim 17 wherein the polymeric gellant and hydrocarbon together contribute between 0.1% and 20% of the total weight of the cleansing composition.

19. The cleansing composition of claim 7 further comprising fragrance.

20. The cleansing composition of claim 19 wherein the fragrance constitutes about 0.1 wt% to about 25 wt% of the total weight of the cleansing composition.

21. The cleansing composition of claim 7 wherein the polymeric gellant constitutes from 0.01 wt% to 10 wt% of the total weight of the cleansing composition.

22. A cleansing composition comprising surfactant and a gel, the gel comprising about 80-99 wt% of a hydrocarbon oil, and about 1 to 20 wt% of a blend of at least two different polymer members selected from the group consisting of diblock copolymers, triblock copolymers, radial block copolymers and multiblock copolymers, with the proviso that there be contained in the composition at least one diblock copolymer or at least one triblock copolymer with said at least one diblock copolymer or said at least on triblock copolymer comprising 5 to 95 wt% of said blend of at least two different polymers, said diblock and triblock polymers comprising segments of styrene monomer units and rubber monomer units.

23. The composition of claim 22 wherein the group consists of diblock copolymer and triblock copolymer, and both the diblock copolymer and triblock copolymer are present in the composition.

24. The composition of claim 22 further comprising an ingredient selected from the group consisting of sunscreen agents, fragrance oils, moisturizers, anti-perspirants, humectants, cosmetic oils, colorant, preservative, and mixtures thereof.

25. A cleansing composition formed by combining ingredients comprising a polymeric gellant, a solvent, and a surfactant; a gel being formed upon combining the polymeric gellant and the solvent.

26. The cleansing composition of claim 25 wherein the polymeric gellant is selected from diblock copolymer, triblock copolymer, multiblock copolymer and radial copolymer, and the solvent is a hydrocarbon.

27. The cleansing composition of claim 25 wherein the surfactant comprises soap.

28. A method of forming a cleansing composition comprising combining a polymeric gellant, a solvent, and a surfactant; a gel being formed upon combining the polymeric gellant and the solvent.

29. The cleansing composition of claim 28 wherein the polymeric gellant is selected from diblock copolymer, triblock copolymer, multiblock copolymer and radial copolymer, and the solvent is a hydrocarbon.

30. The cleansing composition of claim 28 wherein the surfactant comprises soap.

INTERNATIONAL SEARCH REPORT

Int tional Application No
PCT/US 98/25546

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C11D9/22 C11D3/37 A61K7/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C11D A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 91 09106 A (PROCTER & GAMBLE) 27 June 1991	1-6
X	see page 21, line 7 - line 33; claims; table 1	7-13,19, 20
X	US 5 578 299 A (STARCH MIKE) 26 November 1996 see column 3, line 5 - line 60; claims	7,10, 12-26
A	US 3 790 488 A (IINO H) 5 February 1974 see column 2, line 52 - column 3, line 52; claim 1; example 2	7,12,15, 22

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 March 1999	31/03/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Grittern, A

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/25546

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 221 534 A (DESLAURIERS PAUL J ET AL) 22 June 1993 cited in the application see column 6, line 64 - column 7, line 65; claims	7,12-17, 25-29
P,A	US 5 703 026 A (SETSER DREW DOUGLAS ET AL) 30 December 1997 see page 2, line 1 - line 25; claims; examples	1,7-13, 19,20, 25-30

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int tional Application No
PCT/US 98/25546

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9109106 A	27-06-1991	CA 2068423 A EP 0505435 A	15-06-1991 30-09-1992
US 5578299 A	26-11-1996	JP 8175968 A	09-07-1996
US 3790488 A	05-02-1974	NONE	
US 5221534 A	22-06-1993	NONE	
US 5703026 A	30-12-1997	NONE	